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(71) Applicant (for all designated States except US): GREAT HUMAN SOFTWARE CO., LTD. [KR/KR]; 85-3, 10F Allianzfirstlife-Building, Seosomun-Dong, Jung-Gu, Seoul 100-110 (KR).

(72) Inventors; and
(75) Inventors/Applicants (for US only): LEE, Young-sang [KR/KR]; 1002-1006, Jukong Apt., 360-16 Jungkye-Dong, Nowon-Gu, Seoul 139-220 (KR). LEE, Jong-woo [KR/KR]; 1002-1006, Jukong Apt., 360-16 Jungkye-Dong, Nowon-Gu, Seoul 139-220 (KR). PARK, Hye-won [KR/KR]; 1002-1006 Jukong Apt., 360-16 Jungkye-Dong, Nowon-Gu, Seoul 139-220 (KR).

(74) Agent: L & K PATENT FIRM; 701, Daekun Building, 822-5, Yeoksam-Dong, Kangnam-Gu, Seoul 135-080 (KR).

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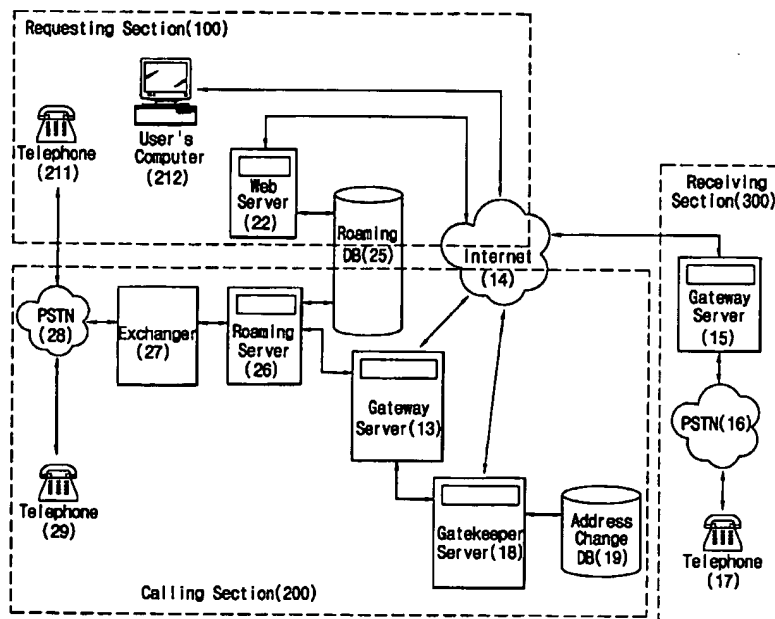
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(54) Title: INTERNATIONAL MOBILE COMMUNICATION ROAMING SERVICING SYSTEM OVER THE INTERNET PROTOCOL

(57) Abstract: The present invention is related to communication systems. More particularly, the invention relates to an Internet phone system for providing telephone service over the Internet Protocol.

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INTERNATIONAL MOBILE COMMUNICATION ROAMING SERVICING SYSTEM OVER THE INTERNET PROTOCOL

5   Technical Field

The present invention is related to communication systems. More particularly, the invention relates to an Internet phone system for providing telephone service over the Internet Protocol.

10

Background of the Invention

Attention recently has been directed to the Voice over Internet Protocol Technology (VoIP) due to its cost reduction benefits in communication achieved through an
15   efficient management of the existing network resources and the easy of maintenance achieved through an integration of telephone and data networks.

Voice communication over the Internet, which differs from the Public Switched Telephone Network
20   (PSTN), has been rapidly developing ever since its first implementation as an Internet Phone Software on 2nd February 1995 by Vocaltec Inc. The initial model now commonly known as the PC to PC model where each caller and receiver communicate through his/her personal
25   computer equipped with a sound card, speaker, microphone and modem (or network card). In this case, the call is achieved by using the identical software that compresses the voice signals, converts them to IP packets and transmits them through the Internet.

30   As the technology progresses, a dedicated gateway server for the Internet call has appeared to act as an interface between the Internet and PSTN. This gateway server is equipped with a Voice Processing Card that enables the users to make Internet calls using the
35   standard telephone set. FIG. 1 briefly illustrates an

overall configuration of the conventional Internet
telephone system commonly known as the Phone to Phone
type. If a caller dials the telephone number of an
Internet Telephone Provider, the call originated from
5   the caller's telephone set 11 is transferred to the
nearest gateway server 13 through the PSTN 12. The
gateway server 13 converts the analog voice signals to
digital signals and consequently compresses them into
Internet Protocol (IP) packets.

10   The gateway server 13, based on the receiver's
number inputted into the caller's telephone set 11,
requests the IP of the nearest gateway 15 from the
receiver's telephone set 17 using a gatekeeper 18
connected over the Internet 14 and transmits the packets
15   to the gateway 15 that possess the corresponding IP. The
gatekeeper 18, commonly called as a Call Agent or Call
Server, carries out conversions of the address between
two different networks (in this case, the address
between the telephone number and IP address as a node
20   over the Internet) and performs as far as the
authorization of the subscribers based on the Internet
Telephony Signaling Protocol (ITSP). This sever is
generally managed by the Internet Service Provider. Here,
ITSP means the standard protocol that defines the
25   required signals and control types for a call setup and
telephone call in the VoIP system such as H.323 or
Session Initiation Protocol (SIP) / Media Gateway
Control Protocol (MGCP).

         The gatekeeper server 18 can be located on any
30   arbitrary position on the Internet 14. Also, it can be
implemented physically on the same gateway server 13 or
can exist as a server connected by an internal LAN
rather than the Internet, as indicated as a broken line
in FIG. 1. The detailed explanations on such
35   configurations have already been disclosed and apparent

to those skilled in the art prior to the filing date of the present invention, therefore, the detailed description will not be provided here.

The gateway 15 at the receiver's side
5   reconfigures/reconstructs the received packets, performs analogue conversion and connects each call to the corresponding receiver through the PSTN using the telephone number of the receiver's side decoded from the signal packets. The use of such Internet telephone has
10 been increasing rapidly due to its outstanding network efficiency and economy over the standard telephone that uses the PSTN. However, the main usage of the Internet telephone lies on International calls rather than local calls due to its complex operational method that must
15 pass through a gateway.

In case of using the International Telephone Roaming Service on the PSTN, if anyone makes a telephone call to a person to his/her local telephone number, while being unaware that he/she is presently on a
20 business trip to overseas, it was possible to automatically connect the call to his/her overseas number following an Instruction Message. However, the usage of the International Telephone Roaming Service on the PSTN was very limited due to its high cost.
25

Disclosure of the Invention

The present invention is designed to overcome the above problems of prior arts. The object of the invention is to provide a system that offers the
30 International Telephone Roaming Service at low cost. Further objective of the present invention is to provide a system that offers the International Internet Mobile Communication Roaming Service at low cost.

According to one feature of the present invention,
35 the International Mobile Communication Roaming System

over the Internet Protocol comprises:

a PSTN server for registering, the home telephone identification number and the International Internet Roaming Request Information that includes the overseas

5 telephone identification number received from the user, to the roaming database, and for receiving the call signals from said home telephone identification number, and for extracting the corresponding overseas telephone identification number by searching through said roaming

10 database using said signals from said home telephone identification number, and for transferring said received call signals together with said overseas telephone identification number;

an Internet Call Server for receiving said call

15 signals from said PSTN server, and for extracting the IP of the overseas gateway nearest to the overseas telephone by searching through the address change database using said overseas telephone identification number contained in said call signals, and for

20 transmitting said call signals to the overseas gateway as Internet Protocol Packets by converting said call signals into digital signals, compressing them and attaching said extracted IP to the Internet Protocol Packets.

25   According to another feature of the present invention, said Internet Call Server further comprises:

a gateway server for receiving said call signals from said PSTN server, and for transmitting address change request signals with said overseas telephone

30 identification number contained in said call signals, and for transmitting the call signals to the gateway. which has the received IP address information after converting said call signals into digital signals, compressing them and converting them to Internet

35 protocol packets;

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a gatekeeper server for extracting and transmitting the IP of the overseas gateway nearest to the overseas telephone in response to the address request signals from said gateway server.

According to further feature of the present invention, said PSTN server receives the International Roaming Request Information from the user's computer which connects via the Internet.

Brief Description of the Drawings

FIG. 1 illustrates an overall configuration of the conventional Internet telephone system commonly known as the Phone to Phone type.

FIG. 2 illustrates the configuration of the International Mobile Communication Roaming Servicing System over the Internet Protocol according to one preferred embodiment of the present invention.

Fig. 3 illustrates the configuration of the International Mobile Communication Roaming Service over the Internet Protocol according to another preferred embodiment of the present invention.

EMBODIMENT

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. The present invention provides an International Internet Mobile Communication Roaming Service that is convenient and economical for the frequent international flyers. By subscribing to the service, the user can forward the incoming calls to his/her mobile terminal at home to his/her overseas number while on a business trip to overseas.

FIG. 2 briefly illustrates the configuration of the International Mobile Communication Roaming Servicing

System over the Internet Protocol according to one preferred embodiment of the present invention. The roaming service system according to one embodiment of the present invention can be explained separately as

5   Requesting Section 100, Calling Section 200 and Receiver Section 300.

The Requesting Section 100 is the configuration for requesting the International Roaming Service. The user's roaming information can be registered to the

10 Roaming Database 25 either by accessing the Web Server 22 through the user's computer which is connected to the Internet 14 or by directly connecting to the Roaming Server 26, in terms of ARS type function, which is connected to the exchanger 27 through a standard

15 telephone set 211.

For example, for the user who dose not wish to miss the calls directed to his/her mobile terminal at home while on a business trip to US, should register the International Internet Roaming Request Information that

20 includes his/her home mobile terminal number as a home telephone identification number and his/her overseas mobile terminal number as an overseas telephone identification number. This information can be registered by accessing the Web Server 22 using the

25 user's Web Browser.

Once the subscription to the International Roaming Service has been completed, the information concerning the status of the user's subscription to the International Mobile Communication Roaming Service over

30 the Internet, home mobile terminal number as a home telephone identification number, overseas mobile terminal number, i.e., a US mobile terminal number subscribed over there, and as an overseas telephone identification number, are registered to the Roaming

35 Database. If anyone dials the user's home telephone

identification number, first of all, the call passes through the exchanger 27 in case it is a Circuit Switching Network and is identified as the call for the user who is registered on the Roaming Database 25.

5   Afterwards, the user's overseas telephone identification number is extracted from the Roaming Database 25 and the call is forwarded to this number. From then on, the signal is transmitted by the Phone to Phone type as explained previously.

10   The gateway/gatekeeper server 13 converts the received analogue voice signals to digital signals, and compress them into IP packets. Also, the gateway server 13 based on the user's received overseas telephone number extracted from the Roaming Server 26, requests to

15 the gatekeeper 18 on the Internet 14 pertaining to the IP of the gateway 15 nearest to the user's overseas telephone set 17. The IP packets are transmitted to the gateway with the corresponding IP address. The gateway 15 recovers the compressed digital signals, converts

20 them to analogue signals and transforms them into the conventional PSTN signals. Afterwards, the gateway 15 transfers the signals to the user's overseas telephone set 17 by setting up the PSTN.

        Fig. 3 briefly illustrates the configuration of

25 the International Mobile Communication Roaming Service over the Internet Protocol according to one preferred embodiment of the present invention. Unlike the embodiment illustrated in Fig. 2, the gateway server and gatekeeper are implement as a single server in this

30 embodiment. Detailed explanations will not be required here since the functions are identical whether the separate servers individually connected through the Internet, or separate processors implemented on the same server, or sequentially constructed processors on the

35 same server.

As shown in Fig. 2, the user can request for the Internet Roaming Service by accessing the Web server 22 through the user's Web Browser 212. For example, for the user who does not wish to miss the calls directed to his/her mobile terminal at home while on a business trip to US should register the International Internet Roaming service Request Information that should include his/her mobile terminal number at home. as a home telephone identification number and his/her mobile terminal number in US as a overseas telephone identification number before leaving for US. This International Internet Roaming Service Request Information is registered in the Roaming Database 25 by accessing the Web server 22 using the user's Web Browser 212. The web server 22 and Mobile server 24 are shown to exist as separate servers in this embodiment, however, physically they can exist on the same server. Also the embodiment can support the Web protocol as well as the Internet Protocol such as HTML or WML.

The present invention is not only limited to the International Internet Roaming Service Request through the Web site but can also be registered by the Mobile Server 24 via the Base Station 23 by calling up a special telephone number provided by the Service Provider using the user's mobile communication terminal 11. In this case, either the existing ARS or more preferably through the mobile communication means such as WAP, SMS, ISMS protocols that is capable of two way text data transmission or reception, can be used.

As a further example, the ARS type that uses the standard Circuit Switching Exchanger as illustrated in the previously embodiment is also feasible. Detailed explanation on such network system will not be provided since the system is apparent to those skilled in the art through many prior arts on the WAP or ARS applications

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disclosed as such. The given three types of examples of the International Internet Roaming Service Request can either be implemented simultaneously, or only one or two can be selectively implemented at a time.

5   Once the subscription to the International Roaming Service has been completed, the information concerning the status of the user's subscription to the International Mobile Communication Roaming Service over the Internet, home mobile terminal number as a home
10   telephone identification number, overseas mobile terminal number, i.e., a US mobile terminal number subscribed over there, and as an overseas telephone identification number, are registered to the Roaming Database. If anyone dials the user's home telephone
15   identification number, first of all, the call passes through the exchanger 27 in case it is a Circuit Switching Network and is identified as the call for the user who is registered on the Roaming Database 25. Afterwards, the user's overseas telephone identification
20   number is extracted from the Roaming Database 25 and the call is forwarded to this number. From then on, the signal is transmitted by the Phone to Phone type as explained previously.

        The gateway/gatekeeper server 13 converts the
25   received analogue voice signals to digital signals, and compress them into IP packets. Also, the gateway server 13 based on the user's received overseas telephone number extracted from the Roaming Server 26, requests to the gatekeeper 18 on the Internet 14 pertaining to the
30   IP of the gateway 15 nearest to the user's overseas telephone set 17. The IP packets are transmitted to the gateway with the corresponding IP address. The gateway 15 recovers the compressed digital signals, converts them to analogue signals and transforms them into the
35   conventional PSTN signals. Afterwards, the gateway 15

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transfers the signals to the user's overseas telephone set 17 by setting up the PSTN.

Industrial Applicability

5   As described previously, the present invention provides an International Mobile Communication Roaming Service over the Internet Protocol in connection with the roaming service and phone to phone type, therefore an International Mobile Communication Roaming Service

10   that is a convenient and economical can be provided.
The invention has been described with reference to the preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is

15   intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

WHAT IS CLAIMED IS:

1. An International Mobile Communication Roaming Servicing System over the Internet Protocol comprising:

5   a PSTN server for registering, the home telephone identification number and the International Internet Roaming Request Information that includes the overseas telephone identification number received from the user, to the roaming database, and for receiving the call

10   signals from said home telephone identification number, and for extracting the corresponding overseas telephone identification number by searching through the said roaming database using said signals from said home telephone identification number, and for transferring

15   said received call signals together with said overseas telephone identification number;

an Internet Call Server for receiving said call signals from said PSTN server, and for extracting the IP of the overseas gateway nearest to the overseas

20   telephone by searching through the address change database using said overseas telephone identification number contained in said call signals, and for transmitting to the overseas gateway after converting said call signals into digital signals, compressing them

25   and attaching said extracted IP to the Internet Protocol Packets.

2. The system according to claim 1, wherein said PSTN server is a mobile server.

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3. The system according to claim 1, wherein said PSTN server receives the International Roaming Request Information from the user's computer which is connected via the Internet.

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4. The system according to claim 1, wherein said Internet call server comprises:

a gateway server for receiving said call signals from said PSTN server, and for transmitting address
5   change request signals with said overseas telephone identification number contained in said call signals, and for transmitting the call signals to the gateway which has the received IP address information after converting said call signals into digital signals,
10   compressing them and converting them to Internet protocol packets;

a gatekeeper server for extracting and transmitting the IP of the overseas gateway nearest to the overseas telephone in response to the address
15   request signals from said gateway server.

5. A method for the International Mobile Communication Roaming Service over the Internet Protocol comprising the steps of:
20   receiving the call signals directed to said home telephone identification number;
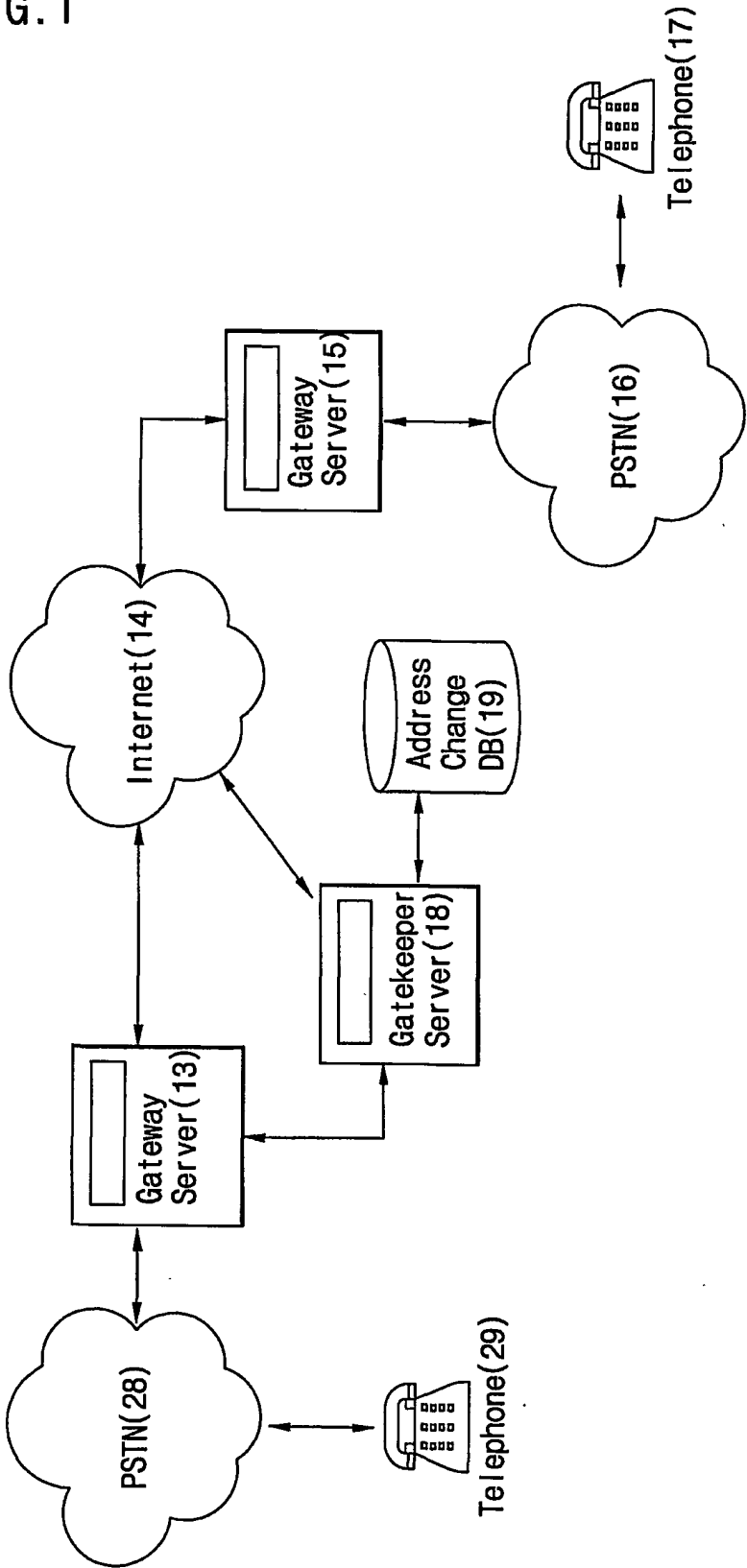
extracting the corresponding overseas telephone identification number by searching through said roaming database from said home telephone identification number
25   received;

extracting the IP of the overseas gateway nearest to the overseas telephone by searching through the address change database from said overseas telephone identification number; and
30   transmitting said call signals to the overseas gateway as Internet Protocol Packets by converting said call signals into digital signals, compressing them and attaching said extracted IP to the Internet Protocol Packets.
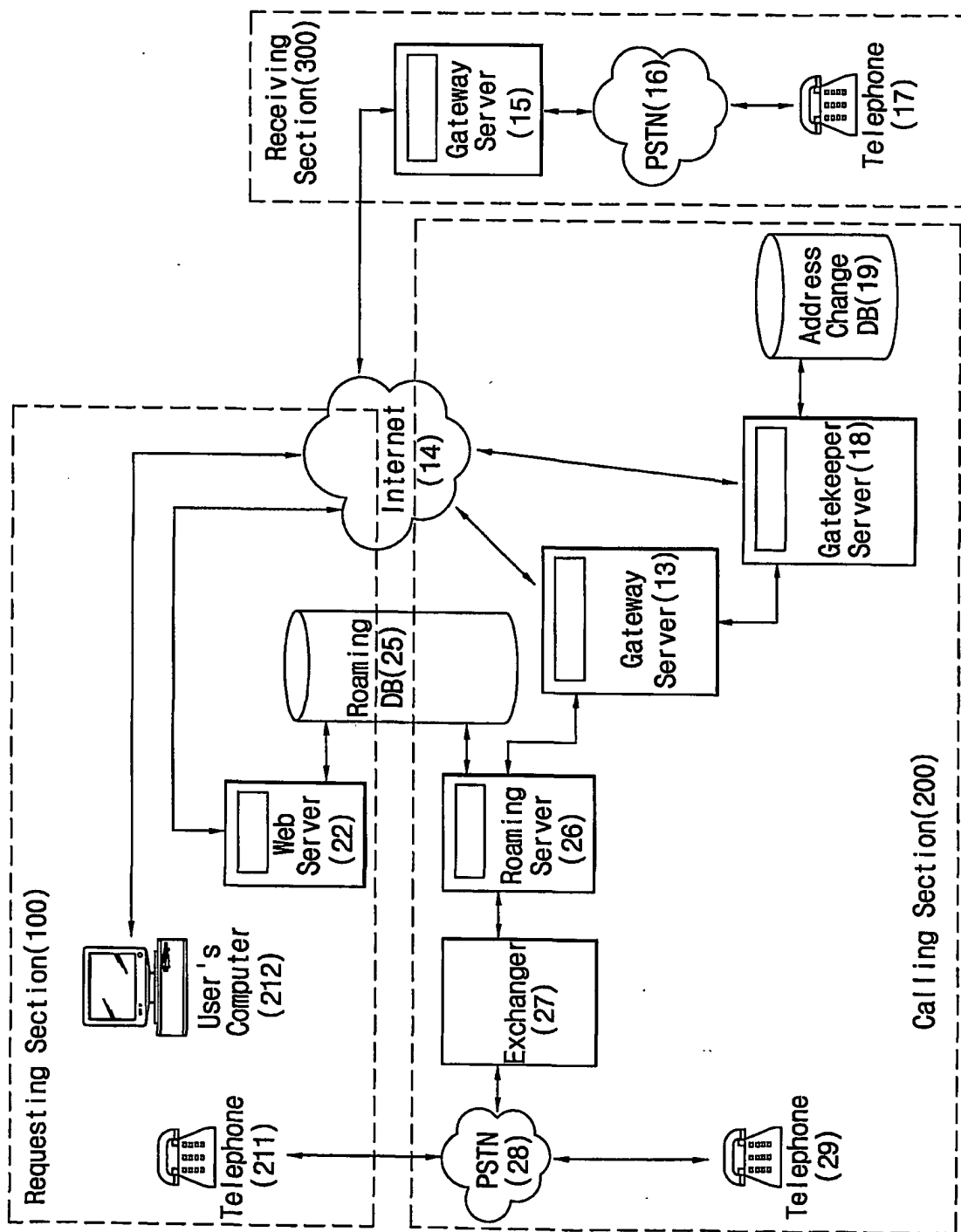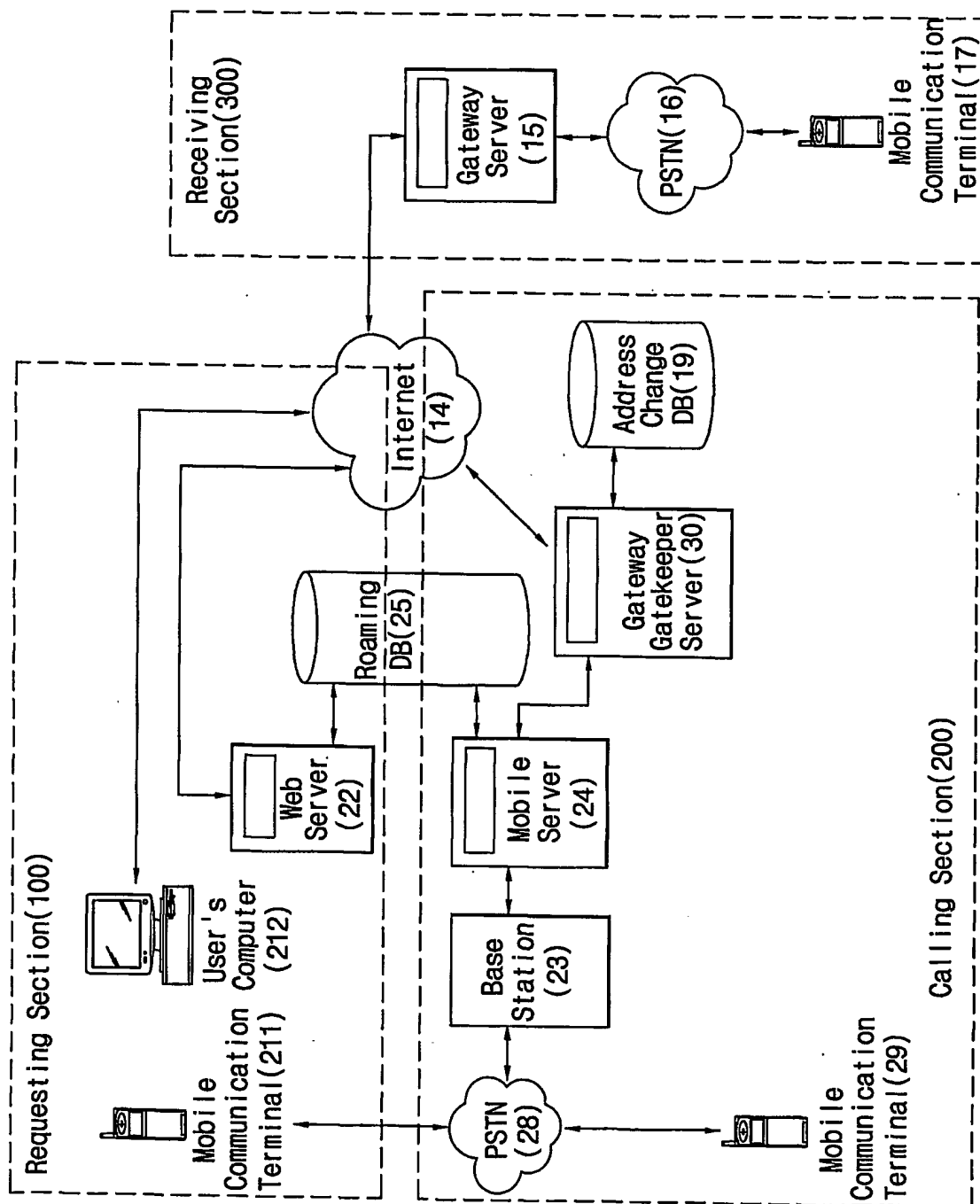
35

FIG.1

FIG.2

FIG.3

INTERNATIONAL SEARCH REPORT

CLASSIFICATION OF SUBJECT MATTER

IPC⁷: H04Q 7/38, 7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: H04L, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, PAJ, EPOQUE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/14960 A1 (TELEFONAKTIEBOLAGET ERICSSON) 25 March 1999 (25.03.99) abstract; figs. 1-3,13; claims.	1-5
X	WO 00/16583 A1 (WONG C) 23 March 2000 (23.03.00) abstract; figs. 1,2; claims 1-6,9,16-19.	1-5

☐ Further documents are listed in the continuation of Box C.   ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
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„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 August 2001 (23.08.2001)	30 August 2001 (30.08.2001)

Name and mailing adress of the ISA/AT	Authorized officer
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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	A	0016583				none	
WO	A1	9914960	25-03-1999	AU	A1	91948/98	05-04-1999
				CN	T	1279863	10-01-2001
				EP	A1	1016292	05-07-2000
				US	A	6097942	01-08-2000